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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,345	10/11/2005	Anke Althoff	14219-074US1/P2002,0642	5755

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EXAMINER	
KEMMERLE III, RUSSELL J	

ART UNIT	PAPER NUMBER
1731	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/523,345	ALTHOFF ET AL.	
	Examiner	Art Unit	
	Russell J. Kemmerle	1731	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 February 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 February 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *01 February 2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

Claim 6 is objected to because of the following informalities: the sections "the second material has a relative permittivity ε_2, where $18 \leq \varepsilon_1 \leq 22$" appears to contain a typo, since it appears ε_1 should read ε_2. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 12 and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "substantially constant" in claim 12 is a relative term which renders the claim indefinite. The term " substantially constant " is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention, since it is unclear how constant the temperature change would have to be in order to be "substantially constant". Claim 13 is rejected as depending from claim 12.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4-7 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Herron (US Patent 4,627,160).

Herron discloses a method of making a laminated ceramic substrate where a plurality of ceramic green sheets are laminated together, and subsequently fired. Herron discloses that the firing process involves several heating steps, including preheating to 200°C in a nitrogen environment, further heating to 450°C in a hydrogen/water environment, continuing to 785°C, and finally sintering in a nitrogen environment at 965°C to sinter the substrates (see Examples I and II, Col 5 line 51 – Col 6 line 68). Herron specifically states that in heating to the sintering temperature there is no prior cooling of the sample (Col 6 lines 55-57). It should be noted that all heating steps described above are carried out in an inert atmosphere

Herron further discoses that in forming the laminated stack via holes are opened in the ceramic green sheets, and that those holes are filed with an electrically conductive (i.e., metalliferous) paste, and that the paste is also used to form line patterns on the surface of the sheets (Claim 15).

Referring to claims 4-6, Herron further discloses an example where the layers of the ceramic substrate is made of different ceramic materials (see, Example 1, Col 5 line 51-Col 6 line 46, specifically Col 6 lines 16-22).

It would be inherent that these layers would posses the relative sintering temperatures as recited in claim 5.

Herron discloses that between these stratified layers, a matealization layer (i.e., an in line pattern) can be formed (see Claim 15).

Thus, Herron discloses every limitation of claims 1, 2, 4, 5 and 7-9, and thus anticipates the claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 6 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Herron.

Herron is relied upon as discussed above, but does not specifically discuss the relative permittivity, ε, of the materials used. Since applicant does not disclose specific materials which would result in ε values such as those recited in claim 6, it is assumed that the recited values are common to those materials known to be used to form ceramic substrates, and would thus be anticipated by examples given by Herron. In the alternative, since applicant does not disclose specific materials which would result in ε values such as those recited in claim 6, it is assumed that one of ordinary skill in the art would know what materials would result in such an ε value, and it would therefore be obvious to one of ordinary skill in the art to modify Herron by using materials would would produce the relative permittivity values recited in claim 6.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Herron in view of Nakatani (US Patent 5,252,519).

Herron is relied upon as discussed above, but teaches that the electrically conductive paste to be used be a copper compound, and does not teach the use of a silver or silver-palladium containing paste.

Nakatani discloses a method for making a stacked ceramic substrate substantially similar to that of Herron. Nakatani discloses that the metal conductor paste used could include, among others, a silver-palladium mixture (Col 1 lines 26-28).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant to have modified the method of Herron as discussed above by using a silver-palladium paste as the metallic conductor as taught by Nakatani instead of the copper compound taught by Herron. This would have been obvious because Nakatani discloses that such a paste is effective as a material for such use, and the advantageous electrical properties of silver-palladium are well known to those in the art.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Herron in view of Harada (US Published Application 2001/0,022,416)

Herron is relied upon as discussed above but does not teach that the heating process occurs in air.

Harada discloses a method of making a ceramic substrate, substantially similar to that of Herron. Harada further teaches that the heating processes for debinding and sintering are carried out in air (Page 3 paragraph 45) (it is assumed that since no firing environment is described that an air environment is used, since any other special environment would be affirmatively disclosed).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the method taught by Herron of firing the ceramic substrate in an inert environment by firing in air as taught by Harada. This would be obvious because Harada discloses that such an environment is effective for firing, and an air environment is cheaper and easier to achieve that an inert environment since nothing has to be added to the firing environment.

Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herron in view of Harada and Tamhankar (US Patent 5,230,846)

Herron and Harada are relied upon as discussed above, but fails to teach that during debinding the environment is switched from inert to air (specifically the special case as recited in claim 13), or the firing cycle recited in claim 12).

Herron discloses the benefits of debinding in an inert environment, while Harada discloses the benefits of sintering in an air environment (as discussed above). However, they do not discuss starting with an invert environment of Herron, and switching to the air environment of Harada, specifically performing this switch during a reduction in the temperature from the maximum debinding temperature to a lower temperature that is equal to or greater than the starting debinding temperature.

Tamhankar discloses a method of firing a ceramic substrate substantially similar to that of Herron and Harada. Tamhankar discloses that during the firing cycle a first temperature is reached where debinding begins (T_{E1}, around 200°C), firing and debinding is then continued up to 500°C in a nitrogen/oxygen/water vapor environment. After a hold at 500°C (T_{E2}), the temperature is reduced to 485°C ($T_{E1'}$) while the firing environment is changed, during this time the environment is nitrogen/hydrogen/water vapor. Firing is then continued (with the temperature never dropping below T_{E1}, 200°C) to a sintering temperature in a nitrogen/water vapor environment (Fig 1).

It would have been obvious to one of ordinary skill in the art to modify the method taught by Herron of firing in an inert environment, by changing the environment after debinding to an air environment, since as taught by Harada an inert environment is not

required after the debinding is completed and an air environment would be cheaper and easier to fire it. It would be further obvious that the change in environment could be accomplished by the method taught by Tamhankar, which teaches an effective method of transitioning from one environment to another during firing without a substantial reduction in temperature at any point during the firing cycle.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell J. Kemmerle whose telephone number is 571-272-6509. The examiner can normally be reached on Monday through Friday, 8:30-4:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RJK/